Acute Concomitant Esotropia of Adulthood

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Purpose: To identify the characteristics of adult patients who develop acute concomitant esotropia of adulthood.

Design: Retrospective noncomparative case series.

Participants: Ten patients were included in this study.

Intervention: The charts of all adults with acute-onset concomitant esotropia who were examined at our institute between 1990 and 1997 were reviewed, and those who had developed the syndrome when they were older than the age of 16 years were included in this study. All participants underwent a complete ocular and physical examination, including brain and orbital computed tomography.

Main Outcome Measures: Angle of esotropia, measured by the prism and cover test.

Results: The mean age ± standard deviation at the time of the ocular and physical examination was 38 ± 18.6 years (range, 18–70 years). The mean myopic error was −4.1 ± 3.2 diopters (range, −2.0 to −8.5 diopters). Nine of the 10 patients were myopic. The mean angle of esotropia was 35.8 ± 14.7 prism diopters (range, 18–60 prism diopters). The mean period of follow-up was 2.2 ± 1.0 years (range, 1–4 years). After surgery, all patients were orthophoric or minimally esophoric, and in all of them, stereoaucity (measured by the Titmus stereofly test) was 40 arc seconds.

Conclusions: In a well-defined group of adult patients with acute-onset concomitant esotropia, almost all were myopic, and all regained normal stereopsis after surgery. Acute concomitant esotropia of adulthood should probably be classified as a distinct subgroup of acute-onset esotropia.

Late-onset esotropia is the term used to describe the onset of esotropia with diplopia after infancy. According to Burian and Miller,1 acute or late-onset esotropia can be divided into three categories: (1) Acute-onset concomitant strabismus after occlusion (Swan type). This may be precipitated by occlusion of one eye or loss of vision in one eye in a patient with or without significant hypermetropia. (2) Concomitant convergent strabismus of the Franceschetti type. In this type of esotropia, there is a minimal amount of hypermetropia. No underlying cause of the strabismus can be found, although Bielschowsky2 attributed the acute onset of the deviation in his patients to physical or psychic shock or exhaustion. Before onset of the strabismus, these patients may or may not have binocular vision. (3) Concomitant convergent strabismus of the Bielschowsky type. These patients are myopic (≤5 diopters) and exhibit a constant esodeviation at distance but not at near fixation. On presentation, the angle of deviation is usually small, but it increases gradually over time. Abduction may be slightly restricted in some cases, prompting Burian and Miller1 to suggest that this type be identified with paralysis of divergence. The list of characteristics of the Bielschowsky type was later modified3 to include higher degrees of myopia, as well as constant and equal deviations at distance and near fixation.

Since that early report, most of the articles published on acute- or late-onset esotropia have described series comprising both adults and children. The aim of this report was to characterize the sudden onset of esotropia in adults, allowing us to define this condition as “acute concomitant esotropia of adulthood.”

Patients and Methods

The charts of all adults with acute-onset concomitant esotropia who were examined at the Goldschleger Eye Institute, Sheba Medical Center, between 1990 and 1997 were reviewed. Patients who met the following criteria were included in this retrospective study: (1) a diagnosis of acute-onset concomitant esotropia (in concomitant esotropia, the deviation, within physiologic limits, is the same in all directions of gaze); (2) age ≥16 years at the time of onset; (3) corrected visual acuity of 6/6 in both eyes; (4) no history of eye problems; (5) no cause of the interruption of fusion; and (6) no history of systemic disease or head trauma. None of the patients had a family history of strabismus.

All ocular examinations, preoperative strabismus measurements, strabismus surgery, and postoperative strabismus measurements were performed by the same physician. Strabismus was measured with the prism and cover test for near (30-cm) and distance (6-m) fixation, as well as for all directions of gaze, with refractive correction. The prism and cover test was performed by holding a cover in front of each eye alternately while the patient maintained fixation. For esotropia, a base-out prism is used to neutralize the ocular movement, and esotropia is measured in terms of the prism strength required to offset the movement. In all
measurments, an accommodative target was used. Cycloplegic refraction was performed in all patients.

All patients in the study underwent a complete physical examination, including brain and orbital computed tomography, and, in some cases, magnetic resonance imaging. All of the study participants underwent surgery, in which an adjustable suture technique was used. The type and amount of surgery are summarized in Table 1. Where necessary, patients underwent postoperative adjustment to orthophoria.

Results

Ten patients were found to have developed esotropia when they were in their late teens or older and were included in this study. In all of them, the esotropia had developed from 2 to 5 years before their eye examination. The delay in presentation was attributable to delay on the part of either the referring physician or the patients themselves.

The age (mean ± standard deviation) of the patients at the time of the eye examination was 38 ± 18.6 years (range, 18–70 years). Computed brain and orbital tomography (and magnetic resonance imaging, where performed) were normal. The mean myopic error was −4.1 ± 3.2 diopters (range, +2.0 to −8.5 diopters). Nine of the 10 patients had myopia, and in 6 of them, myopia was >4 diopters. Only one patient was hyperopic. The mean angle of esotropia was 33.8 ± 14.7 prism diopters (range, 18–60 prism diopters). The mean follow-up period was 2.2 ± 1.0 years (range, 1–4 years). The patients’ data are summarized in Table 1.

Each patient had a corrected visual acuity of 6/6 in both eyes. Anterior segment examination and funduscopic examination were normal except for mild myopic retinal changes seen in some patients. In each patient, the angles of esotropia were equal for distance and for near fixation (differing by <5 prism diopters), and ocular ductions and vergences were normal.

All of the patients underwent surgery. After the operation, all were found to be orthophoric or minimally esophoric, and in all of them, stereoaucity (measured by the Titmus stereodift test) was 40 arc seconds.

Discussion

Three types of acute-onset esotropia have been described: the Swan type, which results from occlusion; the Franschetti type, which is associated with mild hyperopia; and the Bielschowsky type, which is associated with myopia. In speculating on the role of myopia in the development of this syndrome, Bielschowsky3 claims that uncorrected myopia leads to the development of increased tonus of the medial rectus muscles. He suggests that the increase in tonus can be explained by the tendency of individuals with uncorrected myopia to hold print or sewing excessively close to the eyes, with resulting development of esotropia.

Our series of patients showed the following main characteristics:

1. Esotropia had developed after the age of 16 years.
2. The angle of deviation was similar for distance and near fixation.
3. Myopia was present in all but one patient.
4. Esotropia and myopia were the only pathologic conditions.
5. Normal stereopsis was regained after surgical correction of the esotropia.
These patients thus do not meet the criteria of the Swan type, because none of them had been subjected to occlusion of one eye, and none had experienced loss of vision. Concomitant convergent strabismus of the Franceschetti type is associated with a minimal amount of hypermetropia. Only one of the patients met this criterion, but she had not experienced the physical or psychic shock or exhaustion suggested to cause acute onset of the deviation in that type of esotropia.

Because all patients but one (90%) were myopic, their type of esotropia is closest to the concomitant convergent strabismus originally described by Bielschowsky and later modified by Hoyt and Good. Various degrees of myopia, as well as constant and equal deviations at distance and at near fixation, are consistent with this modified definition.

It is unclear why patients whose corrected visual acuity is normal in both eyes and who have normal stereopsis, develop strabismus at all. Bielschowsky’s explanation, implicating uncorrected myopia in the pathogenesis of the esotropia, can be eliminated as a factor in this series, because none of these patients had refrained from wearing their glasses for any significant length of time. Because all of them regained normal stereopsis, decompensated monofixation syndrome could be excluded. Uncorrected hypermetropia was also not an etiologic factor.

The absence of any pathologic signs other than the esotropia and myopia suggests that serious pathology of the central nervous system is unlikely in these patients, although this assumption should be verified in larger study populations than that of this series. Such pathology is more likely to be a factor if the esotropia is nonconcomitant. Nevertheless, concomitant esotropia does not preclude a serious neurologic condition, including a brain tumor. Therefore, the presence of an additional ocular or systemic sign (e.g., nystagmus) in these patients is sufficient to justify a neurologic and neuroradiologic investigation.

Another acquired disorder of ocular horizontal version that results in esotropia is divergence insufficiency. This syndrome is characterized by ocular ductions and comitant esotropia only at distance, whereas at near fixation, the patient is orthophoric. This type of strabismus differs from the type described in our series of patients, in whom deviation was the same for distance and near fixation.

The findings of this study are in agreement with those of Ohtsuki et al., who found no relationship between the time of the operation and the postoperative development of stereopsis and no differences in the proportion of patients with bifixation between groups with early and delayed operation. All of the patients in this series achieved normal stereopsis even though the operation was performed 2 to 5 years after the onset of esotropia.

In most of the published reports of late-onset or acute-onset esotropia, the study populations have included both adults and children, and some have comprised children only. In the latter group of studies, a large majority of the patients had hyperopic refraction. In the mixed series of adults and children, however, whereas most of the children were hyperopic, most of the adults were myopic. In one such study, in which 9 of the 10 patients were children, all of the children were hyperopic, and the single adult was myopic. Because our study population was restricted to adults, it is proposed that the term acute concomitant esotropia of adulthood be used to describe this syndrome. The good binocular vision achieved after surgery by all of these patients can be explained as follows: binocular vision had apparently developed normally in all of the patients before the onset of esotropia, and, therefore, it could have been retained and later recovered after the strabismus was corrected. Thus, whereas the term acute-onset esotropia may be used to describe the syndrome in both children and adults, it is suggested that the term acute concomitant esotropia of adulthood be restricted to older patients only and that it be considered as one of the subgroups of acute-onset esotropia. Other subgroups include accommodative esotropia, acquired nonaccommodative esotropia of childhood, esotropia secondary to abnormalities of the central nervous system, esotropia secondary to ocular sensory defects (this includes the Swan type), divergence paresis, and acute inconstant esotropia. Recent studies have shown that acquired nonaccommodative esotropia of childhood is more prevalent than congenital esotropia. In one of the studies performed in these children, two with acquired nonaccommodative esotropia developed bifoveal fixation after successful treatment, but most showed only some degree of stereopsis (mean, 705 arc seconds).

By defining patients with acute concomitant esotropia of adulthood as a separate subgroup, it is possible to characterize this subgroup in terms of certain common features, such as its association with myopia. Its most important distinguishing feature, however, relates to the surgical outcome. The success rate in re-establishing good stereoscopic vision after surgery in this group of patients is high, unlike in children described as having esotropia of acute onset.

References